

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

In the Matter of:

Transition from circuit-switched network to all IP Network	GN Docket Nos. 09-47 09-51 09-137
Comments - NBP Public Notice #25	

COMMENTS OF EMPIRIX, INC

Empirix, Inc hereby submits to the Commission its comments on a transition from circuit-switched network to all IP network. As a telecommunications technology company with a long history of solving some of the telecommunications industry's most difficult service reliability problems, Empirix has worked across the world on implementing solutions focused on ensuring the end users' experience in converged networks (merging of IP and TDM based networks), and we also have broad experience working with site-based IP-only networks of varying size.

Empirix is a technology company based in Bedford, Massachusetts that helps organizations worldwide to accelerate the development, deployment and operations of new IP communications by validating the quality of user experience and overall performance of complex networks and applications. As the Commission begins its examination of the issues surrounding a future shift from traditional circuit-switched networks to a more cost effective IP-based network, Empirix believes that the issues surrounding service reliability are critically important. As such, we strongly support the Commission issuing a broader Notice of Inquiry (NOI) surrounding a transition to IP-based networks and ask that issues related to service reliability be included so they can be examined in detail. To help inform the Commission as it develops such a NOI, Empirix outlines below a number of issues related to a switch to an IP-based network and also provides our views on how they may best be addressed.

Clear Policy is Required to Ensure Reliability during the Migration

It is important to understand that even without a clear government policy towards the development of an IP-based network, traditional PSTN service is shrinking in footprint. Due to market demands and continuing technology improvements, IP-based services are quickly replacing and augmenting this older, circuit-switched technology. However, conflicts and challenges are occurring on a greater level, and the development of a national IP-network will only cause such issues to increase. As this technology switch occurs, it is necessary to have the proper tools in place to assist with this migration and clear policy requirements from the Commission to ensure reliability during this time.

Internet Service Providers (ISPs) are quickly becoming the next generation of Competitive Local Exchange Carriers (CLECs), and CLECs are becoming the next generation of ISPs. Once an ISP deploys an IP-based network and an infrastructure is in place to pass packets, it is typically used to transport data, video, and lastly voice. CLEC's are adding IP-based networks to work in conjunction with the traditional PSTN networks in hope to offer enhanced services to compete with ISPs and cable companies (MSOs). This market-based transition in technology and services is an effort that the Commission should strongly support through policy changes designed to ensure technology interoperability during the migration period.

IP-based networks are typically designed for non-real-time applications such as video and data. The end user has tolerance for this type of payload to be transported within a reasonable time. When it comes to two-way voice transmission, it is the experience of Empirix and its customers that delay is not tolerated. Voice, even when specialized platforms are used to transmit it, is a real time application that is being forced on a non-real time network.

That expectation has been reinforced by over a century of real-time or near-real-time voice service over the various historic iterations of circuit-switched networks. Today's circuit-switched

networks operate with certain protocols to set up and tear down calls. These are typically SS7, ISDN, or CAS. These protocols now have to interact with IP-based protocols like SIP, MGCP, H.323, etc, and will need to interact with any future IP protocols. Even in today's world of limited but growing voice-over-IP (VOIP) usage, making sure that this translation occurs is a complex issue and service levels must be maintained.

To address these challenges, many service providers are significantly invested in very detailed and intensive network performance measurements, such as Empirix's XMS technology focused on voice. For these large providers carrying and connecting voice transmissions over circuit and IP-based networks, performance measurement is not simply a tool to generate statistics for advertisements, it is a necessity. When the right technology is used correctly by a service provider, it can be used to grow consumer confidence, respond to consumer problems, and ensure that network performance is in line with the very clear and long-standing level of public expectation. The need for these tools to be available grows as voice transmission across IP-based networks grows, and Empirix calls on the Commission to include the need for developing strong requirements for these tools as part of a NOI regarding a migration to an IP-based network.

The Commission Needs to Develop a Long-term Reliability Policy

One important aspect of Empirix's tools and how they are used by our customers is that our solution is not only used to measure network performance, but is also used to respond to network problems. Circuit-based networks are, in many ways, more forgiving than IP-based networks in terms of reliability and identifying network problems. Instead of a software backbone with low tolerances, circuit-based networks are largely based upon hardware developed upon decades-old principles and with high tolerances built into to ensure long-term performance. While the Commission should ensure that the market continues to drive service reliability, Empirix feels that the needs of a long-term reliability policy must be included as part of the proposed NOI.

An example of how Empirix's technology is currently used to ensure reliability in VOIP communications show just how important such a policy is as the United States looks towards an all-IP-based telecommunications network:

Telecommunications Provider A offers broadband service throughout its suburban service area, and many of its residential and consumer users use VOIP for some or all of their voice communications. Provider A is also a user of Empirix's XMS solution, a decision that was made as Provider A looked at the demand for VOIP throughout its service area and the impact the lack of a reliability solution was having on its costs and customer retention rates. Under its use of XMS, as soon as the quality of the connection degrades below Provider A's defined threshold, the network operations team is alerted so that they can take action. The XMS Solution not only assures that the end user is receiving quality service, but it also provides the "real-time" feedback to the service provider that the network and its components are functioning as designed.

Without such a reliability solution, it is up to the end user complaining that they are unsatisfied with the service they are receiving before the service provider can address the problem. Not only does this delay add cost to resolving problems, but it will also increase the number of unsatisfied customers. However, since there has been a move to an all-IP-based network, many of these customers, especially those in the commercial and governmental sectors do not have any other options available to address their specific service issues, and because this is a national IP-based network, even the smallest level of service degradation impacts the entire network. If left unresolved, it is easy to see how a service problem that starts out small can increase and cause a potentially crippling disruption.

Figure 1 below shows a schematic example of the XMS solution and how it is used to measure network performance:

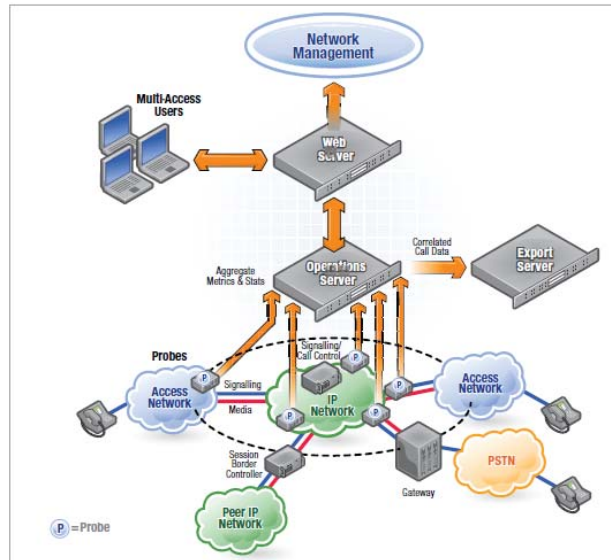


Figure 1: Hammer XMS carrier-class architecture.

As outlined in the last section, performance measurement is of significant importance when voice transmission is occurring between a converged circuit switch and IP-based network, but those needs do not go away when the switch to an all-IP-based network is made. Indeed, as shown above, they only grow. Unlike data service, the margins for voice reliability over an IP-based network are much smaller, with even small reliability problems leading to data loss or service disconnection.

In examining the issues facing a switch to an IP-based network, the Commission should look at the way such a change in use will impact the network. Today, residential use of VOIP is centered around either tech-savvy households who have moved to a service like Vonage for all of their calls or households that utilize a circuit-based network telephone for the bulk of their calls and use a service like Skype for international or long-distance calls. Despite the rapid growth of VOIP services, the legacy circuit-based network still carries the bulk of voice communications, and is seen by the public as the dependable standard for demanding usage such as those related to public safety, homeland security, health care delivery, education, worker training, and other important national priorities.

A move to an all-IP-based network and the shifting of all these uses will bring about significant impacts to the existing and future IP network, and measurement factors such as connection latency, voice quality (MOS, R-factor), and call completion must be in place to operate on a 24/7 basis to ensure the reliability of the network for such demanding requirements. By including the development of a long-term reliability policy in the NOI, the Commission will better understand the impacts such a significant increase in usage will have on network performance and can make informed policy determinations focused on ensuring the long-term reliability of a national IP-based network.

Policy must be Focused on Measurement-based Reliability

Such a long-term reliability policy must take steps to ensure that service providers are looking at the right measures of network performance and are setting up strong, consumer-focused standards and thresholds. While it is certainly possible to obtain a broad, general picture of network performance through samples, such measurement does not truly address the concerns of consumers, nor does it provide a service provider with the tools necessary to address specific network performance issues. Therefore, as the Commission looks towards an all-IP-based network, Empirix feels that there is a need to ensure that such measurement will be focused on the factors that matter to consumers, and that any reliability-focused policy must be based on robust, consumer-focused network reliability measurements. If you can address the performance and reliability for voice applications on an IP-based network, you solve the hardest problem facing service reliability across the entire volume of use for the network.

Measurement systems must be put in place to measure the “customer experience.” This is the true measure of how a network is performing, and the factors involved in such experience should be considered under the NOI. It is Empirix’s experience that when devices are placed at aggregation points in the network, such a plan allows for visibility to endpoints and inward through

the network. This type of topology is essential for ensuring the reliability of voice/telephony based applications under today's limited level of usage; under a national IP-based network its necessity would only become clearer. The long-term reliability policy should, from the start, include a requirement that reliability and network performance monitoring be included as part of the network foundation, not simply an add-on. This would make data available on every connection, giving service providers the tools to provide service reliability under an IP-based network to a level that meets customer expectations developed under their experience with circuit-switched networks.

Ensuring the Success of a National Measurement-based Long-term Reliability Policy

Whether it is ensuring voice-connectivity during the migration or ensuring the long-term reliability of voice transmission over a national IP-based network, there are a number of steps that the Commission needs to take to ensure the success of a long-term reliability policy, and these steps should be considered as part of the proposed NOI.

The Commission must ensure that providers of all sizes will be able to access the solutions necessary to implement a robust and market-driven long-term reliability policy. Empirix has installed its services at providers of all sizes, so we understand the significant challenges that smaller providers face when looking towards investments in a monitoring solution. Some service providers have used the XMS with as few as 5,000 subscribers. Just because a customer receives service from a small service provider or is located in a rural or tribal area does not mean that they are less impacted by service reliability problems than a user located in an urban area and served by a Tier I provider. Ensuring reliability is a keystone to providing quality service and, as outlined above, will be necessary once a move to a national IP-based network is made.

The Commission should also include as part of the NOI the need to examine what non-regulatory policy changes need to be made to support a reliable, all-IP-based network. The

Commission, Congress, and the Administration are all considering significant changes to existing programs such as the Universal Service Fund as well as additional proposed programs to bring broadband and IP-based communications service to more communities. The NOI should explore what changes to those programs are necessary to ensure that these networks can meet any future reliability requirements either from the Commission or from network users and consumers.

As outlined in our above comments, Empirix is committed to working with the Commission, other policymakers, service providers, and the public on addressing the reliability needs of a transition to an all-IP-based network, both through the migration period and into the long-term. To address these needs, the Commission needs to take steps now to outline what those concerns may be and what specific steps are necessary. As such, Empirix strongly supports the Commission issuing a NOI that includes making reliability part of the Commission's policy framework with specific inquiries regarding ensuring reliability during the migration, developing a long-term measurement-based reliability policy, and providing the regulatory and policy tools to make the process a success for the American people. Should the Commission have any inquiries about the specific topics or Empirix's specific experiences in these areas, please do not hesitate to be in touch.

Respectfully Submitted,

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